

# Illinois Innovation Index

Innovation news and metrics for metropolitan Chicago and the state of Illinois



**2013 Quarter 2**

## Talent in Illinois and Chicago: Data and recent trends

The Index is brought to you by the Chicagoland Chamber of Commerce, Chicago Metropolitan Agency for Planning, Illinois Science & Technology Coalition, and World Business Chicago. In partnership with Illinois Innovation Network.

This quarterly edition of the Illinois Innovation Index explores the role of talent in innovation by examining recent trends in the attainment of science, technology, engineering, and math (STEM) degrees in Illinois; tracking the growing demand for STEM occupations; and measuring the attraction and retention of a key component of the state and regional workforce. For companies in a range of industries, including high-tech startups and advanced manufacturing, a sufficient STEM workforce is required for every phase of innovation.

### **Highlights from this issue**

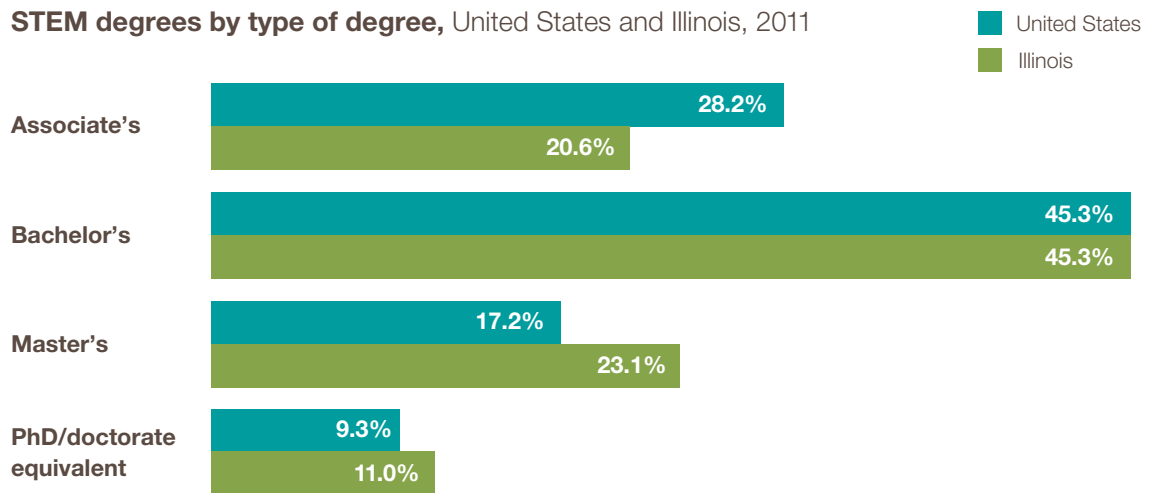
- Within the Chicago region, computer occupations make up the largest STEM segment—and one of the only ones for which degree attainment and employment demand are growing.
- Growth in IT employment in Chicago is outpacing overall employment growth in a range of industries, particularly manufacturing and health care.
- While Chicago is a magnet for 25- to 34-year-olds from Midwestern college towns, the region is losing more of this age cohort to other metro areas than it is attracting.

## Supply of qualified STEM workforce

Over the past decade, the number of STEM degrees conferred in Illinois has increased by nearly 10,000 or 40 percent, with computer science, engineering, and health-related degrees experiencing the greatest growth. During the same period, however, Illinois lagged behind the nation in the share of STEM degrees as a share of all degrees—21.6 percent vs. 25.7 percent. During the same period, the volume of STEM degrees conferred in the United States increased by 50 percent.

The impact of STEM degree attainment can be gauged by not only total numbers but also the types of STEM degrees. A high-functioning economy requires a diversity of skill sets to support and pursue innovation. Comparing Illinois to the nation as a whole reveals that a greater portion of Illinois' STEM degrees are concentrated at the graduate degree level, with master's or doctorate degrees accounting for 34.1 percent of local STEM degrees vs. 26.5 percent at the national level. These graduates have a higher level of training to lead the operations of innovative companies or drive research-intensive discovery, making them an important component of the innovation economy. At the bachelor's level, Illinois also exhibits an intensity in the production of computer scientists, exceeding that of other states such as New York (10.6 percent of all STEM bachelor's), Massachusetts (9.4 percent), and California (9.1 percent). Illinois does, however, fall behind the national percentage of associate's degrees, which are required for many of the fastest growing STEM occupations. New and enhanced public-private partnerships, such as those between the City Colleges of Chicago or [Illinois Pathways Initiative](#) participants and local businesses, are aligning curriculums to workforce needs and strengthening proven strategies that support education attainment.

STEM degrees by type of degree, United States and Illinois, 2011



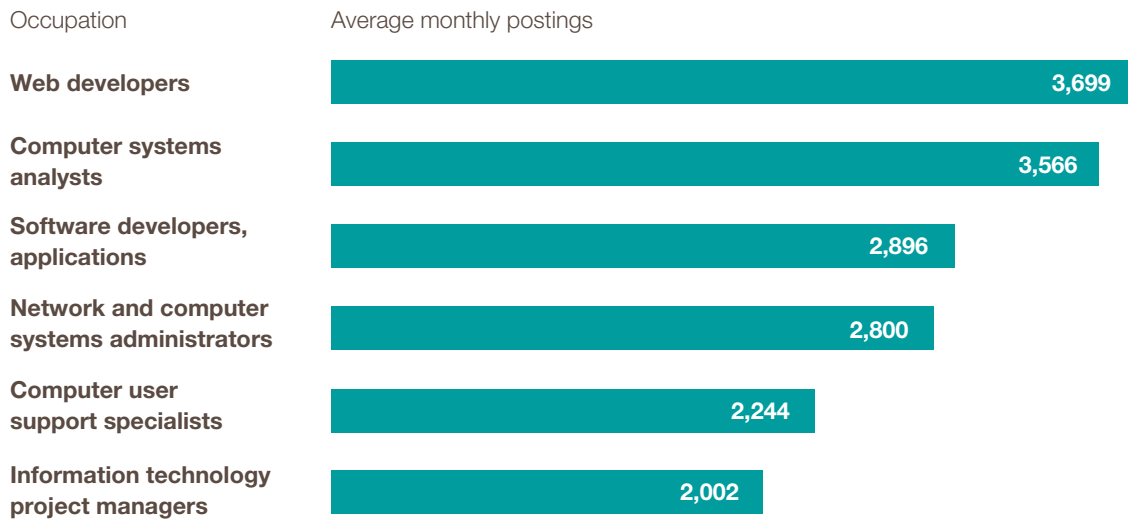
Source: Integrated Postsecondary Education Data (IPEDS)/National Center for Education Statistics (NCES) Completions Survey

## Growing demand for STEM occupations

The greater integration of technology into operations and the role of innovation in economic growth are driving an increased need for individuals with STEM degrees. In Illinois, demand for STEM graduates is projected to rise from 266,000 in 2008 to nearly 320,000 in 2018; 57 percent of these occupations will be for computer technicians, programmers, and scientists.<sup>1</sup> Online job postings are one indicator of job market trends and offer snapshots of demand throughout the year. According to CareerBuilder, IT job postings in Chicago have increased 18 percent year over year. Additional data from the Conference Board Help Wanted OnLine showed that 6 of the top 20 occupations in Chicago by number of job postings were in IT: Web developers, computer systems analysts, software and app developers, and network and computer systems administrator occupations each averaged approximately 3,000 job postings per month.

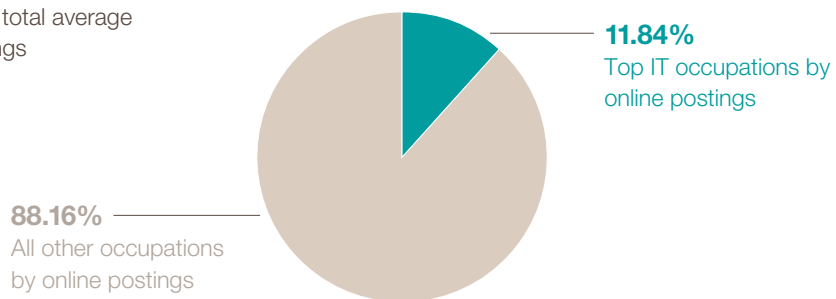
<sup>1</sup> Georgetown Public Policy Institute's Center on Education and Workforce, *STEM*, Georgetown University, October 2011.

### Top IT occupations by online posting, Chicago region, 2012



**17,207 total average monthly postings**

Percentage of total average monthly postings



Source: The Conference Board Help Wanted OnLine (HWOL)

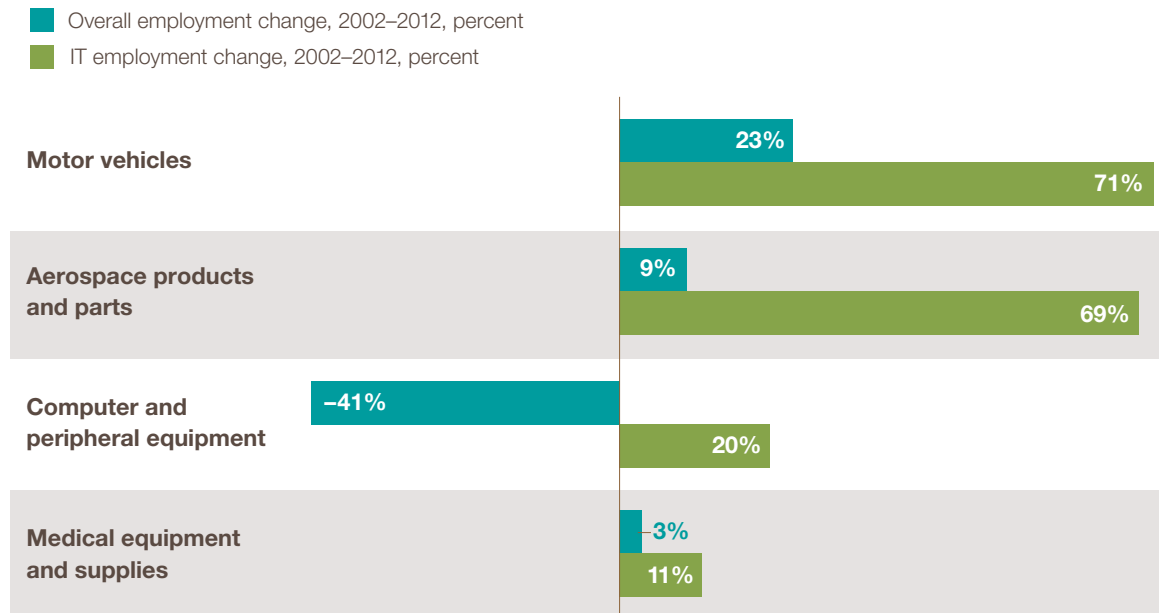
## Rising importance of IT

An examination of STEM positions over the past decade shows that despite decreases in many STEM jobs, the Chicago metro remains competitive in computer science occupations. A National Center for Education Statistics (NCES) study of undergraduate employment indicates that while Illinois is roughly on par with the nation in terms of overall STEM undergraduate employment rates, the state is highly specialized for placements in computer-related occupations.<sup>2</sup> For a comparison of other STEM occupations, refer to the [April Index](#).

<sup>2</sup> Based on an analysis of data from the National Center for Education Statistics Baccalaureate and Beyond Survey, 2007–2008 (the latest available), Illinois has a location quotient (LQ) of 1.48 for STEM undergraduates employed in computer science occupations one year after graduation. An LQ above 1 indicates a higher specialization in a given STEM occupation compared with the national average; conversely, an LQ below 1 connotes less specialization.

IT positions have become increasingly vital to enable and drive innovation and basic operations in a range of industries. For example, as manufacturing adopts new technology to become more precise and efficient, the demand for talent such as systems and software developers and educated technicians has risen while it has declined for lower-skilled production workers and team assemblers. The growth rate of IT workers in several manufacturing segments stand out. In aerospace and computer equipment manufacturing sectors, for example, IT employment has risen 60 percentage points faster than overall employment.

**Employment growth in select manufacturing segments, overall and IT positions, Chicago region, 2012**



Source: Economic Modeling Specialists Intl., a CareerBuilder company

Health care is experiencing a similar trend. The transition to electronic health records and the Affordable Care Act (including health insurance exchanges and consumer-facing web-sites) have led providers and insurers to build their tech workforce. The rapid growth of IT occupations in private hospitals also demonstrates the importance of technology to health care operations. While IT employment is still relatively small—in 2012, it accounted for just 1 percent of all private hospital employment—the number of IT occupations in private hospitals increased by 33 percent from 2002 to 2012. By comparison, total employment at private hospitals rose three percent during this time. In addition, biotechnology and pharmaceutical companies increasingly rely on new technologies such as systems biology, bioinformatics, digital modeling, and other IT-based R&D fields to advance the discovery and product development processes.

Several specific occupations within broader STEM categories have exhibited notable growth. Biomedical engineer is the region’s fastest growing position and is needed by a number of industries. Manufacturing currently employs more than 67 percent of all biomedical engineers, followed by research and development (17 percent) and medical facilities (7 percent). The Chicago region leads the nation in food manufacturing, and the industry’s demand for agricultural and food science technicians has outpaced the national rate. These positions, which are concentrated primarily in R&D (40 percent) and manufacturing (33 percent), play an important role in supporting innovation in the industry.

### Fastest growing STEM occupations in Chicago region<sup>1</sup>

Occupation	Number of regional jobs, 2012	2002-2012 change, percent, regional	2002-2012 change, percent, national
<b>Biomedical engineers</b>	<b>604</b>	<b>87%</b>	<b>114%</b>
<b>Agriculture &amp; food science technicians</b>	<b>391</b>	<b>15%</b>	<b>6%</b>
<b>Environmental science and protection technicians</b>	<b>854</b>	<b>12%</b>	<b>20%</b>
<b>Nuclear engineers</b>	<b>767</b>	<b>9%</b>	<b>17%</b>
<b>Forensic science technicians</b>	<b>406</b>	<b>7%</b>	<b>16%</b>

<sup>1</sup>With at least 200 region positions in 2012. Excludes occupations in the social sciences.  
Source: Economic Modeling Specialists Intl., a CareerBuilder company

To find qualified employees, companies are relying more heavily on staffing companies; the number of temporary positions in Chicago grew by approximately one-third in the past decade, outpacing national growth, which rose by 14 percent during this time. According to the Conference Board's Help Wanted OnLine, the number of staffing companies among the top ten companies by volume of online job postings in Chicago grew from two in 2011 to five in 2012, perhaps reflecting an increased reliance on contingent labor. Recent research indicates that contingent and temporary positions are approximately 2 to 3 percent of total national employment; this proportion holds true for STEM and non-STEM occupations.

## Hiring trends in IT-related occupations

Growing demand for temporary and project-based employees is reshaping how companies recruit and hire IT labor. Chicago-based Fieldglass provides software and services to help businesses including GlaxoSmithKline, Johnson & Johnson, Rio Tinto, Salesforce, and Verizon procure and manage their contract workforce. Fieldglass, which added 100 employees in 2012 and is on pace to match that this year, is well acquainted with the challenges of recruiting IT employees to support its operation and business strategy. Fieldglass' Chief Technology Officer Sean Chou shared his insights on the company's strategy for local IT workforce recruitment and development.

**Finding the right talent.** Fieldglass recently expanded its recruitment beyond STEM degrees to consider candidates with a general aptitude and willingness to be trained in a professional services software firm. This strategy reflects the more integral role that technology plays in business operations. The company trains new hires in-house but has considered partnering with an educational institution to develop a curriculum for potential candidates. For IT placements, Fieldglass is more interested in specific infrastructure training experience than a bachelor's degree. Its major

recruitment channels include internal employer referrals and external networks such as LinkedIn.

**Being strategic about the use of permanent hires vs. contract labor.** Most of Fieldglass' professional service and "core" IT positions are full-time employees or offshore services. This approach enables Fieldglass to build and retain intellectual capital within the organization. The company relies on contract labor either for high-end, very specialized projects or for short-term needs such as data cleaning, for which the labor is more commoditized.

### **Extracting value from staffing companies.**

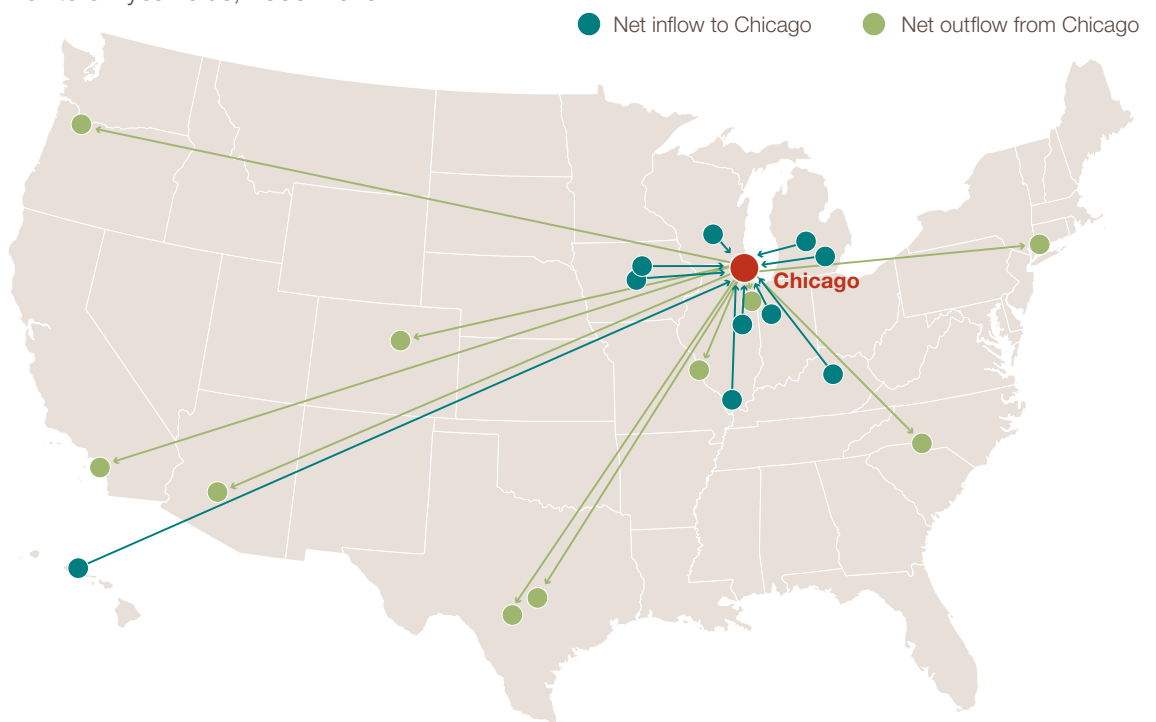
Much like many professional services firms and larger companies, Fieldglass does not have a year-round need for certain positions. When one-time projects requiring specialized help arise, a staffing company can provide access to a pool of employees that collectively have a wider range of "off-the-shelf" skills that don't require additional training investment—a valuable advantage for specific tasks such as user experience testing.

## Talent attraction and retention

<sup>3</sup> Due to confidentiality concerns, the Census Bureau suppressed nearly one-third of all records for the 25–34 age cohort. As a result, the numbers reflect statistically significant in- and outflows, not necessarily the largest net changes, which may have larger margins of error. Please refer to [worldbusinesschicago.com/blog/young-adult-migration-analysis-2013](http://worldbusinesschicago.com/blog/young-adult-migration-analysis-2013) for more information.

With sustained demand for STEM occupations, the challenge for states and metro areas is to attract and retain qualified workers to fill these positions. U.S. Census American Community Survey (2006–2010 estimates) data reveal that Chicago is a magnet for 25- to 34-year-olds from Midwestern college towns. However, the region is losing more members of this cohort to other metro areas than it is attracting. When accounting for the margins of error, only 28 metros showed a statistically significant difference in average annual inflows to and outflows from Chicago.<sup>3</sup> Each year, an estimated 8,841 25- to 34-year-olds moved to Chicago from these 28 metros, while 11,631 left Chicago, creating a net loss of 2,790 Chicago residents. The top ten source and destination metros are illustrated in the following map.

**Top metro areas by annual net inflows to/outflows from Chicago, 25- to 34-year-olds, 2006–2010**



### Top 10 net inflows to Chicago

Madison, WI; Champaign–Urbana, IL; Lafayette–West Lafayette, IN; Iowa City, IA; Ann Arbor, MI; Lansing–East Lansing, MI; Honolulu, HI; Carbondale, IL; Lexington, KY; Ames, IA

### Top 10 net outflows from Chicago

Los Angeles, CA; Denver, CO; Phoenix, AZ; Kankakee,<sup>1</sup> IL; Austin, TX; St. Louis, MO; Portland, OR; Charlotte, NC; San Antonio, TX; Bridgeport, CT

<sup>1</sup>While Kankakee is not part of the Chicago MSA, it is part of the Chicago-Naperville, IL-IN-WI combined statistical area (CSA) as defined by the U.S. Office of Management and Budget (OMB).

Source: U.S. Census American Community Survey, 2006–2010



<sup>4</sup> For more information, see this issue of the ISTC's Catalyst newsletter.

The current immigration laws also affect the state's ability to retain high-skilled workers. Each year in Illinois, more than 40 percent of students graduating with a master's or doctorate degree in STEM subjects are temporary immigrant residents.<sup>4</sup> In 2011, nearly 2,700 high-level specialists in areas such as computer programming, data analysis, engineering, and biomedicine were unable to obtain longer-term work visas after graduating from Illinois institutions. In losing these graduates, Illinois misses out on the scientific and technological expertise they could bring to our universities, businesses, and communities.

## Building on local strengths moving forward

A qualified talent pool is critical to support a healthy economy, and the need to train, attract, and employ a STEM workforce will become more important. As a result, the Chicago region and Illinois will face greater competition from urban centers where innovation is thriving. Policy makers, businesses, educational institutions, economic development organizations, and other leaders in innovation and STEM fields should use existing, successful initiatives as a foundation for expansion. This issue revealed several trends, opportunities, and challenges that should be further explored to help shape and support growth of a competitive talent pool.

- The state and region have a lower percentage of associate's degrees in STEM than the national average. A [recent report](#) from Brookings found that more than half of STEM jobs are performed by people with an associate's degree or less yet pay 10 percent more than other jobs requiring the same level of education. These jobs represent an important opportunity for the workforce and are also required to support growth in STEM-related businesses. Chicago and Illinois recognizes this shortfall and has recently launched several initiatives to become a leader, such as the [City Colleges Reinvention](#) and the [Illinois Pathways Initiative](#), public-private partnerships intended to better align industry needs with education objectives.
- Temporary workers are becoming an increasingly important resource for many employers; the number of temporary workers (both in STEM and non-STEM) has increased by nearly a third over the past decade. This trend raises several questions on the benefits and challenges for employers and workers. Since the regional increase in temporary workers exceeds the national level, it may be worth additional research to understand the factors contributing to this trend.

- The region and state are home to numerous quality educational institutions, yet our ability to attract and retain 25- to 34-year-olds remains a challenge. The migration data show that Chicago succeeds in attracting this cohort within the Midwest but loses more of this population to other parts of the country. Since employers depend on a robust and skilled workforce, a number of targeted recruitment, retention, and training initiatives are under way such as ThinkChicago: Lollapalooza 2013, a four-day event that will introduce 100 of the nation's top technology and computer science students to Chicago's technology industry and one of the country's most popular musical festivals. ■

**For full migration analysis sourcing and methodology, follow [this link](#).** →

**For STEM definition and methodology, refer to the [April 2013 Index](#).** →



The Index would like to acknowledge CareerBuilder and The Conference Board Help Wanted Online® (HWOL) data series in cooperation with Illinois Department of Employment Security (IDES) as data partners for this issue.

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